

PATENT CLAIMS

1. A method for estimating a value of a vector of variables p in a mathematical model representing a physical process, where a state vector x of the model is estimated by a State Augmented Extended Kalman Filter (SAEKF),

characterized in that the vector of variables p represents one or more properties of the process and is representable by a function of the state vector x ,

and that the method comprises the steps of

- a) measuring values for measured variables u ,
- b) incorporating the vector of variables p as an augmented state in the SAEKF, and
- c) computing an estimate of the complete state including the augmented state according to a SAEKF algorithm.

2. Method according to claim 1, wherein system equations of the model estimated by the SAEKF are representable as

$$\begin{bmatrix} \dot{x} \\ \dot{p} \end{bmatrix} = \begin{bmatrix} f(x, u, p) \\ 0 \end{bmatrix} + v$$

where $f(x, u, p)$ represents a known dependency of the change \dot{x} in system state from the system state x , the measured values u and the vector of variables p , and v represents noise disturbances.

3. Method according to one of claims 1 to 2, comprising the step of estimating parameters of a representation of the vector of variables p in terms of the state vector x .
- 5 4. Method according to one of claims 1 to 3, wherein the physical process comprises a turbomachine, and the vector of variables p represents at least one of an efficiency or a mass flow rate of the turbomachine.
- 10 5. Method according to one of claims 1 to 3, wherein the physical process comprises a heat exchanger, and the vector of variables p represents at least one heat transfer coefficient of the heat exchanger.
- 15 6. Method according to one of claims 1 to 3, wherein the physical process comprises a mating gear transmission, and the vector of variables p represents a backlash and spring function.
7. Method according to one of the preceding claims, where a Recursive-Prediction-Error-Method is used instead of the SAEKF.
- 20 8. Computer program for estimating a value of a vector of variables p in a mathematical model representing a physical process which is loadable and executable on a data processing unit and which computer program, when being executed, performs the steps according to one of the preceding claims.

9. Data processing system comprising means for carrying out the steps of the method according to any one of the claims 1 to 7.